Characteristics of Fire Loss in a Group of Native American Homes: Recommendations for Loss Reduction. B. Kevin Molloy, Class of 1988.

From both a physiological or psychological standpoint, there's no disease that affects man worse than a burn. More people die in fires in the United States than in any other industrialized country in the world. For Native Americans, house-fire death rates are more than twice the rate of whites. It has been estimated that scientific approaches to control of fires could reduce the death rate by 50% in one year.

The National Institute for Burn Medicine estimates that more than 2,000,000 people in the US receive some form of burn in a year.[22] Burns and fires are the fourth leading cause of unintentional injury death in the United States. In recent years they have caused more than 6,000 deaths annually and required approximately 90,000 people per year to be admitted to hospitals for treatment. Hospitalizations for burns often are lengthy and costly since a great deal of treatment is necessary for severe burns.

House fires cause three-fourths of all fire-related deaths in the US and for ages 1-64 are the leading cause of death from unintentional injury in the home.[20] As previously mentioned, housefire death rates for Native Americans are more than twice the rates for whites.[3] Mierly and Baker report that although "...the death rate from other fires and burns has decreased dramatically, the death rate from house fires has remained fairly constant". This is especially tragic since it is believed that fire morbidity and mortality could be reduced substantially with the implementation of proper approaches to the control of fires.[20,23] This project examines fire losses among a group of Native American houses and provides recommendations for reducing fire losses among houses under the auspices of the AMERIND Risk Management Corporation.

AMERIND is a risk management corporation for the National American Indian Housing Council which represents American Indian housing authorities across the United States (representing approximately 60,000 houses). AMERIND is interested in reducing fire losses in American Indian and Alaska Native communities and therefore is participating in this project.

OBJECTIVES:

1. To review and describe fire loss data from the AMERIND database.
2. To make program and policy recommendations based upon reviews of AMERIND data and current literature in injury prevention.

METHODS:

In order for one to understand the causes and nature of injury problems, it is necessary to capture and interpret a certain amount of information relating to injury events. This information is often captured through some sort of surveillance system. For this study, the RISX-FACS CLAIM REGISTER, a database maintained by AMERIND, is the basis of the surveillance system. This database contains information concerning damage losses from fire and other sources from November 1, 1986 to date. Data relating to type of loss, source, cause, nature, and description of damage are included in the database. The AMERIND database does not currently contain data on injuries. For the purposes of this project, fire loss data have been used as an indicator of injury potential since it was not feasible to obtain data on actual injuries.

Data from the AMERIND system were reviewed for November, 1986 - July 1987 and November, 1987 - July 1988. These data were provided by the AMERIND Risk Management Corporation. The data were collected by claims investigators who submitted the data to Gallagher Bassett Services, a company which compiles the data for AMERIND and provides periodic summaries in the form of reports. Reports specifically used in this study were the Loss Analysis Reports covering the time periods mentioned above.

When injury data are analyzed, patterns usually materialize since injuries are not random events.[3,9,16,27] These patterns can be used to target intervention strategies as well as to direct further research. Review of fire loss data in this study reveals patterns relating to cause of fire. Unfortunately, certain levels of detail are lacking in the current data. These details are crucial for developing targeted interventions for reducing fire losses. Since these details are not currently available, the development of specific intervention programs is not a component of this project. However, the data are sufficient to provide indicators for directing further activity in a fire-loss reduction program. There are a number of ways one can rank fire losses. The method of ranking directly affects the order of ranking. The AMERIND data were ranked (1) by frequency of fire by cause; (2) by average cost-of-loss per event by cause.

RESULTS:

Ranking by Frequency of Fire by Cause:

For ease of discussion, the time period of 1986 - 1987 will be designated as period 1 and the time period of 1987 - 1988 will be designated as period 2. Grease fires are the most frequent cause of fire loss among the homes in the study. This cause differed little over the two periods of the study. The second ranking cause was fires started by

children. In contrast to the relatively stable number of claims for grease fires, the number of claims for fires started by children, arson, wood stoves and furnaces approximately doubled from period 1 to period 2. Fires caused by chimneys and flues more than tripled over the same time span. Losses caused by explosions dropped dramatically from period 1 to period 2. It should be noted that the frequency of many of the causes of fire loss is relatively small and therefore it would be difficult to draw conclusions about changes from one period to another.

Ranking by Average Cost of Loss per Event by Cause: Arson is the most costly loss per event, costing approximately double the second ranking category of gas explosion. Grease fires, which ranked highest in frequency of cause, are just below the middle of the chart when comparing costs per event. The unknown category ranks third.

DISCUSSION:

The major causes of residential fires in the US are heating and cooking.[1,8] In this study, cooking (grease) fires were the most frequent cause of residential fires; however, fires caused by heating were ranked 6th, 8th, and 10th, depending on the specific source of heat. Fires caused by children (2nd), electrical problems (3rd), smoking materials (4th), and arson (5th), were more frequent than fires cause by heating sources. Obviously, the fire losses among the Native American homes in this study differ substantially from the characteristics of fire loss among other US populations. It is therefore important to tailor fire loss-reduction programs for the populations served by AMERIND and not to merely follow national fire loss reduction programs. Cigarettes are the leading cause of *fatal* house fires. [20] Unfortunately, the AMERIND database does not include data on injuries or deaths from which to draw conclusions.

Recommendations:

"To attack fire deaths effectively, it is essential to have sufficient knowledge about fatal fires to set clear priorities for intervention and research." [6] The major emphasis of the AMERIND database concerns monetary loss. It is important, however, to consider human loss as well. I recommend that information relating to deaths and injuries be added to the AMERIND dataset. These data should include the following:

1. Designation that injuries were or were not involved.
2. Designation that deaths were or were not involved.
3. Number of people injured and/or killed
4. Types/extent of injuries or cause of death
5. Brief narrative concerning victims and fire event to include information such as approximate ages of victims and any information relating to circumstances surrounding the fire.

Since fire death rates are so high among Native Americans, it is important to determine what types of fires are causing these deaths. By including injury information with other fire loss data, it will be possible to determine what category of fires are causing injury and death. This information is necessary to provide direction for the development of intervention programs to reduce fire-related morbidity and mortality.

By looking only at the *number* of fires in a particular region, it is difficult to assess if there is an unusually severe fire problem. There may be a large number of fires, but there may also be a large number of homes in that region. An adjustment must be made to relate the number of fires in a region to the number of homes in a region. A common way of doing this is to calculate rates. Rates offer a method to measure the amount of a condition (house fires) in a given time, to a population base (the number of homes in the region) in the same area at the same time. With rates, it is easy to compare one region to another and see patterns if they exist.

AMERIND should routinely calculate fire rates for the different regions it serves to see if a particular region has an urgent fire problem. The method for calculating rates should follow the following formula:

Fire Rate = Number of fires in a region in a time period/ Number of homes in that region

Rates should then be compared between regions to assess regional differences. When differences are found, further investigation should be conducted to determine the cause of such differences. The following is an example:

> Region X has 10 fires caused by grease in 1990. There are 600 homes covered by AMERIND in this region. To calculate the "Grease Fire Rate" for Region X this data is inserted into the above formula:
>
> Grease Fire Rate = 10/600 = 0.01666

It is preferable to express rates in whole numbers. Therefore 0.01666 is multiplied by 1000. This yields a Grease Fire Rate of 16.6 grease fires per 1,000 homes. If one compared the rate for region X (16.6 per 1,000) to region Y (say, 4 per 1,000), one could conclude that region X's Grease Fire Rate was considerably higher and it might be prudent to determine causes and possible interventions. Perhaps region X has different cultural practices in cooking or perhaps there is a flaw in the design of the kitchen around the stove.

Prevention programs must be based on scientific methods and not just tradition or "gut feelings". This approach goes by several names. The "scientific approach", the "epidemiologic approach" or, in the fire industry, "scenario analysis". All these approaches essentially follow recommendations made by the late William Haddon.[27] The premise of these approaches is as follows when directed toward fire loss:

"Any fire is the result of a chain of events, or "scenario": a source of heat and a combustible material come together under conditions suitable for ignition. Break the scenario by eliminating or modifying the heat, the material or the circumstance uniting these, and the fire will not occur…Review of fatal fire reports soon leads to the conclusion that a small number of scenarios recur in the ignition of fires and lead to many fire deaths. If these ignition scenarios can be identified in detail and broken, the savings in lives will be great."[6] This process can occur in several ways, however gathering of information relating to the events is paramount.

Many fire prevention programs have concentrated on educating the public. Programs such as Project Burn Prevention, Fire Safety Week, The Stop, Drop, and Roll Program, fire prevention newsletters, and The Danger House Fire Demonstration are just a few examples of such programs. Unfortunately, it has not been proven that these types of programs are effective at reducing injuries from fires. In fact, some of the programs that have been evaluated did not reduce the incidence or severity of burn injuries.[17,19] Several studies have shown similar results in other education-oriented injury prevention programs.[18,27,28]

Passive measures that automatically protect the community from injuries are usually more effective than active measures that require persistent behavior change.[2,11,19,27] Therefore it is recommended that fire loss reduction programs follow the direction of other IHS injury prevention programs and concentrate on "passive" measures such as environmental modification before relying on active measures such as behavior modification.[4,10,13,24,26,27,29]

Studies have shown the fire loss problem to be a very complex one and comprehensive solutions will no doubt be complex as well. However, it has also been shown that a small number of ignition scenarios recur frequently.[6] It is critical to intervene and break that ignition chain. This can be done in a number of ways.

Manage the heat of ignition: The cigarette is by far the most common heat of ignition in fatal fires.[5,6,13,25] The technology for self-extinguishing cigarettes is available. AMERIND should join other organizations such as the American Burn Association and the National Fire Protection Association (NFPA) in endorsing campaigns for the production of self-extinguishing cigarettes. Cooking equipment contributes prominently in Native American house fires through ignition of grease. The National Indian Fire safety Manual, developed by the NFPA for the National American Indian Safety Council, indicates that a number of homes surveyed had "widespread use of combustible interior finish materials beyond that anticipated by the [HUD] MPS" [Minimum Property Requirements/Standards]. Additionally it was noted that "A lack of hood or shield over kitchen ranges to protect from grease accumulation and ignition of cabinetry was noted."[22] AMERIND should develop an investigative procedure for evaluating construction materials for Native American housing and encourage modifications where necessary in existing housing and modification of plans for future housing.

Detect the Fire Promptly: Smoke detectors are now widely available, inexpensive, and effective in giving early warning of a fire. Homes with smoke detectors have half the risk of death from fires compared to homes without detectors.[10] However for detectors to work, they must be properly installed and operational. One-fourth to one-third of detectors are non-operational: "Dead batteries, missing batteries, or other power supply problems accounted for 61% of 95 cases studied in which detectors failed to activate in unwanted fires. The other principal problem identified was incorrect installation."[21]

It has been suggested that, "one-fifth of the homes in the United States have no detectors at all, just over one-fourth have detectors that do not work, and just over one-half have at least one working detector. Looking at this as an opportunity means that restoring operational status to the non-working detectors would have as much impact as installing detectors in the remaining homes that do not have them."[12] AMERIND should promote programs to require smoke detectors in all residences and to conduct maintenance program for all detectors.

Limit Fire Growth By Automatic Suppression: The advent of rapidly responding sprinkler heads in 1978 and revision of fire protection codes have made residential sprinkler systems practical. "No multiple loss of life [three or more non-firefighting people] due to fire or smoke has taken place in fully sprinklered buildings, and property loss is placed at one-fifth of that for unsprinklered buildings. In 1978, a typical installation was estimated at 1% to 2% of the average new home price...[However,] revision of codes has potentially made some installations even more affordable." Maintenance of these systems is reported to be reasonable and concerns over water damage are unfounded since damage from smoke is usually far more extensive than water damage.[1] AMERIND should encourage the installation and maintenance of residential sprinkler systems through various incentive programs such as reduction in premiums.

Finally, education programs should be evaluated and modified to make them most effective. The participants should be both the general public and the decision makers who can make changes to protect the public.[19]

CONCLUSION:

Data are available to direct prevention programs to reduce fire losses among Native American populations. Current scientific literature is available, as well, to direct these programs. More information is needed to further understand the fire loss problems at hand; however, modifications to existing data collection systems to obtain this information are within reason. Now is the time to follow these guidelines and reduce the suffering and loss from fires. It is an exciting time because we can really make a difference!

Disclaimer: The opinions expressed in the paper are the those of the author and do not necessarily reflect the views of the U.S. Public Health Service, the Indian Health Service, or the AMERIND Risk Management Corporation.

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